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1986 Insect Pest Management Guide

LIVESTOCK and LIVESTOCK BUILDINGS

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Successful pest management is an essential part of efficient and profitable livestock production. Although pest-related losses are often inconspicuous, flies, lice, mites, and ticks can cause significant reductions in meat, milk, wool, and egg production. Several livestock pests also transmit important diseases.

Effective management of livestock pests should include the use of cultural, mechanical, and biological control tactics as well as the application of chemical insecticides. Insecticides should be viewed as supplements to, not replacements for, sanitation and sound cultural practices. Used properly, insecticides efficiently reduce pest populations without injuring livestock or threatening the safety of the pesticide applicator or the ultimate consumer of animal products.

This publication provides recommendations for safe and effective use of livestock insecticides. It is revised annually; always use the current year's issue. Registration changes that occur between revisions will be announced to appropriate media sources and county extension offices. If you have questions about the use of insecticides for livestock insect management, consult your county extension adviser.

Selection of the insecticides listed on the following pages was based on EPA registrations and on efficacy data reported by entomologists of the University of Illinois College of Agriculture, the Illinois Natural History Survey, and other midwestern universities. If listed insecticides fail to provide pest control, please contact your county extension adviser or the Entomology Extension office at the University of Illinois.

Additional sources of information. In the tables, leaflets outlining the life history, biology, and habits of livestock pests are indicated by the letters "NHE" and

the leaflet number. Request these leaflets at your county extension office or from Entomology Extension, 172 Natural Resources Building, 607 East Peabody Drive, Champaign, Illinois 61820. Additional pest management publications available from the Office of Agricultural Publications (47 Mumford Hall, 1301 West Gregory Drive, Urbana, Illinois 61801) include Circular 899, *1986 Insect Pest Management Guide: Field and Forage Crops*; Circular 900, *1986 Insect Pest Management Guide: Home, Yard, and Garden*; Circular 925, *Insect Pests of Cattle*; Circular 897, *1986 Insect Pest Management Guide: Commercial Vegetable Crops and Greenhouse Vegetables*; and Circular 1136, *Alfalfa Weevil Pest Management Program*.

Using livestock insecticides. The pesticide user is always responsible for the results of insecticide applications to his livestock and crops, as well as for problems of pesticide drift and contamination. All users should observe the following rules.

- Read the label and follow directions and safety precautions. Be sure that the insecticide is specifically labeled for the pest and animal in question and the application method planned. **THE LABEL IS THE LAW.**
- Use face masks or respirators and protective clothing during spraying. Avoid breathing spray mist or dust.
- If pesticides are spilled on the skin or clothing, wash thoroughly with soap and water and change clothes.
- Do not eat, drink, or smoke when handling pesticides.
- Provide adequate ventilation when applying pesticides.
- Do not exceed registered rates of application. Improper or excessive applications can endanger livestock and result in illegal residues in meat and milk.
- Obey the preslaughter interval listed on the label.

- Avoid drift to adjacent cropland, yards, woodlots, lakes, or ponds. Some materials may injure or kill fish, wildlife, and crops.
- Do not treat animals that are sick, overheated, or stressed from shipping, dehorning, castration, recent weaning, and other causes.
- Avoid contamination of feed, mangers, water, milk, and milking equipment.
- Do not spread treated manure on crops that are not listed on the pesticide label.
- Accurately record all pesticide usage. Include the pesticide's trade name, formulation, dilution, application rate, and date of treatment.
- Store pesticides in their original, labeled containers, safely locked away from children, pets, and livestock.
- Dispose of empty pesticide containers promptly and properly according to specified recommendations. Do not breathe smoke from burning containers.
- Contact a physician at once in all cases of suspected poisoning. Symptoms of organophosphate poisoning include blurred vision, abdominal cramps, and tightness in the chest.

Poison Resource Centers. The Poison Resource Centers listed below have been established to provide information about the treatment of poisoning cases. Anyone with a poisoning emergency can call the toll-free telephone number for help. Personnel at the Resource Center will provide first-aid information and refer callers to local treatment centers if necessary.

NOTE: The information in the following tables is for educational purposes only. Reference to commercial products or trade names does not constitute an endorsement by the University of Illinois and does not imply discrimination against other similar products. Trade names are presented for reasons of clarity only. The reader is urged to exercise the usual caution in making purchases or evaluating product information.

Poison Resource Centers supplement, but do not replace, local emergency medical services. Do not delay calling local emergency medical personnel to request immediate assistance or transportation. If possible, have the pesticide container and label present when you call or reach a treatment center or hospital.

Chicago and northeast Illinois

1753 West Congress Parkway
Chicago, Illinois 60612
Telephone: 800-942-5969

Northern and central Illinois

530 N.E. Glen Oak
Peoria, Illinois 61603
Telephone: 800-322-5330

Central and southern Illinois

800 East Carpenter
Springfield, Illinois 62702
Telephone: 800-252-2022

Preventing livestock poisoning. Every year livestock animals die after consuming pesticide granules, wettable powders, or dusts that have been spilled on trucks, wagons, or soil surfaces. Animals consume the pesticide alone or with feed grains or forage placed on the contaminated surface. Prevent livestock poisoning by properly containing and disposing of spilled pesticides and by storing all pesticides in locked facilities that are inaccessible to domestic and wild animals, as well as to children.

Beef Cattle and Nonlactating Dairy Cattle

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
LICE (NHE 18) $\frac{1}{16}$ to $\frac{1}{8}$ inch long. Biting lice are reddish, flattened, and active. Sucking lice are gray to blue and sluggish. Heavy populations cause poor growth, general unthriftiness, and anemia. Symptoms are rough, patchy hair coats and a dirty appearance. Lice are most troublesome when cattle are crowded in shelters during winter months.		Self-treatment devices such as back rubbers, face rubbers, and dust bags effectively control lice when used in conjunction with systemic insecticides applied from August through October for grub control. The systemics kill lice that are present on animals during the fall; the self-treating devices then hold louse populations below economic levels throughout the winter. Place rubbing devices and dust bags where cattle will use them. For back rubbers and face rubbers, mix insecticides with No. 2 fuel oil, No. 2 diesel fuel, or an oil recommended on the insecticide label. Mineral oil is less irritating than fuel oil. Do not use waste oil or motor oil. Keep dust bags dry. Service self-treating devices at least once per month.		
	Back rubber or face rubber (oilers)	Co-Ral 11.6% EC (coumaphos)	1 gal/13 gal fuel or mineral oil.	0 days. Do not apply with oral drenches, with other internal medications such as phenothiazine, or with natural or synthetic pyrethroids, synergists, or organophosphates.
		malathion 57% EC	0.5 pt/1.5 gal fuel or mineral oil.	0 days.
	Dust bag	Products listed for use in dust bags can also be applied by hand-dusting. Follow label directions.		
		Co-Ral 1% D (coumaphos)	10 lb dust/bag. Use 1 bag/10-20 head.	0 days.
		Ectiban or Permethrin 0.25% D (permethrin)	10 lb dust/bag. Use 1 bag/10-20 head.	0 days.
		Rabon 3% D (stirofos)	4-8 lb dust/bag. Use 1 bag/10-20 head.	0 days.

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Beef Cattle and Nonlactating Dairy Cattle, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
LICE, cont.	Spray	Apply sufficient spray to thoroughly wet each animal. Do not contaminate feed or water.		Use up to 1 gallon finished spray per animal.
		Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	2 gal/100 gal water.	0 days. Make a second application 10-14 days after first. Repeat as necessary but not more often than every 7 days. Do not treat Brahman cattle.
		Co-Ral 11.6% EC or 25% WP (coumaphos)	2 qt 11.6% EC or 2 lb 25% WP/100 gal water.	0 days. Do not treat calves less than 3 months old or sick, convalescent, or stressed cattle. Do not spray within 10 days after shipping, weaning, or disease exposure. Do not spray in nonventilated areas. Do not apply in conjunction with other organophosphates, pyrethroids, synergists, or phenothiazine.
		Delnav 15% EC or 30% EC (dioxathion)	1 qt 15% EC or 1 pt 30% EC/25 gal water.	0 days. Do not treat more often than every 14 days. Do not use on dairy cattle or in dairy barns. Restricted-Use.
		Ectiban 5.7% EC (permethrin)	1 qt/100 gal water.	0 days. Repeat treatment 14-21 days after first application. Do not treat more often than every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for control of lice on beef cattle. Check product labels for dilution and application rates.)		
		malathion 57% EC	1 gal/100 gal water.	0 days. Do not apply to lactating dairy cattle or within 14 days of freshening. Do not treat calves less than 1 month old.
		Rabon 50% WP or 24% EC (stirofos)	4 lb 50% WP/75 gal water or 1.5 gal 24% EC/100 gal water.	0 days. Beef cattle only.
		methoxychlor 25% EC or 50% WP	2 qt 25% EC or 2 lb 50% WP/25 gal water.	0 days. Repeat treatment 14-21 days after first application. Do not use on dairy cattle or in dairy barns.
		Ravap 28.7% EC (stirofos plus dichlorvos)	1 gal/75 gal water.	0 days. Beef cattle only. Do not treat more often than once every 10 days.
	Pour-on or spot-on	Fall applications of systemic pour-ons and spot-ons such as Co-Ral (coumaphos), Warbex (famphur), Tiguvon (fenthion), Neguvon (trichlorfon), and Prolate (phosmet) for grub control also reduce louse populations. These treatments may not provide season-long louse control through the winter. Follow label directions concerning reuse after grub treatment cut-off dates. Products listed below effectively control lice, but do not provide grub control.		
		Dursban 44 (chlorpyrifos)	2 cc/100 lb body weight.	14 days. Beef cattle only. Apply as spot treatment. Do not exceed 16 cc/animal. Do not treat calves under 3 months old or bulls over 8 months old. Do not treat purebred continental or exotic breed cattle such as Charolais, Chianina, Simmental, and Gelbveih. Do not retreat within 30 days. Do not use on cows within 21 days prior to calving or 14 days after calving.
		Lysoff 7.6% EC (fenthion)	1 pt/1 gal water. Use 1 fl oz/100 lb body weight.	21 days; 35 days if 2 applications are made. Do not apply within 28 days of freshening of dairy cattle. Pour evenly along back line. Do not treat calves under 3 months old or sick, convalescent, or stressed livestock. Do not use with other cholinesterase-inhibiting insecticides or drugs.
	Injection	Ivomec 1% (ivermectin)	Ready to use. 1 cc/110 lb body weight.	35 days. Inject subcutaneously. Use aseptic procedures. Do not use on dairy cattle of breeding age.

Beef Cattle and Nonlactating Dairy Cattle, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
CATTLE GRUBS Larvae ("grubs") bore through the skin and migrate within the host to the skin of the back. Grubs ruin hides and reduce weight gain. The hairy, yellow and black adult flies, slightly smaller than honey bees, annoy grazing cattle.	Timing of grub control treatments is important. Systemic insecticides applied as pour-ons, spot-ons, or sprays travel within the animal's bloodstream and should be applied to control grubs 6 to 8 weeks before they migrate to the animal's back. Late treatments may cause host-parasite reactions with symptoms of bloat, hindquarter paralysis, or death. Systemic insecticides should be used on native beef cattle herds in August or September in southern Illinois, and in September or October in the northern half of the state. Treat only pastured cattle in herds with histories of grub problems. Animals in confinement are not attacked by ox warble flies (heel flies). Heel fly season and grub treatment dates are earlier for cattle grazed in southern states. Cattle feeders should either know the origin of feeder cattle to determine grub treatment dates or should purchase only cattle that have received grub treatments.			
	Do not apply systemic insecticides in conjunction with or immediately after phenothiazine, with pyrethrins or synthetic pyrethroids or their synergists, or with other organophosphate insecticides. Do not treat cattle under stress from castration, dehorning, weaning, shipping, illness, or overexertion. Do not treat calves less than 3 months old.			
	Pour-on	Apply pour-ons using a long-handled dipper supplied by the manufacturer. Apply to the back line from the shoulder to the hip.		
		Co-Ral 4% (coumaphos)	Ready to use. Apply 0.5 fl oz/100 lb body weight.	0 days. Do not apply within 14 days of freshening of dairy cattle.
		Neguvon 8% (trichlorfon)	Ready to use. Apply 0.5 fl oz/100 lb body weight. Do not exceed 4 fl oz/animal.	21 days. Do not apply within 7 days of freshening of dairy cattle.
		Prolate (GX-118) 11.6% E (phosmet)	1 gal/2 gal water. Apply 1 fl oz/100 lb body weight. Do not exceed 8 fl oz/animal.	21 days. Do not apply to dairy animals.
		Tiguvon 3% (fenthion)	Ready to use. Apply 0.5 fl oz/100 lb body weight.	35 days. Do not apply within 28 days of freshening of dairy cattle.
		Warbex 13.2% (famphur)	Ready to use. Apply 0.5 fl oz/100 lb body weight. Do not exceed 4 fl oz/animal.	35 days. Do not apply within 21 days of freshening of dairy cattle. Do not use on Brahman or Brahman crossbreeds.
	Spot-on	To apply spot-ons, use the applicator system provided by the manufacturer. Apply the material to a single location on the back midline.		
		Spoton 20% (fenthion)	Ready to use. Apply 4 cc/300 lb body weight. Do not exceed 20 cc/animal.	45 days. Do not treat dairy cattle of breeding age.
Spray	Use high-pressure sprays (250-350 psi) to apply 3 to 4 quarts of finished spray per animal. Because few farm sprayers generate sufficient pressure for proper application, veterinarians and commercial applicators with appropriate livestock spray equipment should be contacted to apply grub sprays. Use a pencil stream of spray directed at right angles to the sides and back. Treat 10 or fewer animals at one time. Do not contaminate feed or water.			
		Co-Ral 25% WP or 11.6% EC (coumaphos)	12-16 lb 25% WP or 8-12 qt 11.6% EC/100 gal water.	0 days. Do not apply within 14 days of freshening of dairy cattle.
		Prolate (GX-118) 11.6% EC (phosmet)	2 gal/100 gal water.	21 days. Beef cattle only.
Injection		Ivomec 1% (ivermectin)	Ready to use. 1 cc/110 lb body weight.	35 days. Inject subcutaneously. Use aseptic procedures. Do not use on dairy cattle of breeding age.
MANGE MITES Microscopic mites live on the skin or burrow into it. Lesions vary with mite species. Infestations are greatest when cattle are crowded in shelters during winter months.	Chorioptic mange is the most prevalent mite-induced disorder of Illinois cattle. Infested cattle may or may not develop lesions: lesions usually occur as localized nodules that exude serum. They are most numerous from the tailhead to the hind heels. Insecticides listed previously for louse control on beef cattle also control chorioptic mange mites. Cattle scabies (psoroptic mange) is a quarantinable disease. Its symptoms are lesions that occur first on the withers, over the back, and at the tailhead. Small wounds cause itching, and rubbing leads to abscesses, especially on the shoulders and rump. Mites move to edges of scabs, causing lesions to enlarge and coalesce. Scabs may cover much of the body. Where cattle scabies is detected, contact the Illinois Department of Agriculture, Bureau of Animal Health, Illinois State Fairgrounds, Springfield, Illinois 62706, 217/782-4944.			

Beef Cattle and Nonlactating Dairy Cattle, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
TICKS 8-legged adults of most species are reddish brown and less than ¼ inch long. Engorged females may exceed ½ inch in length. Ticks are blood feeders and disease vectors.	Spray	Ticks rarely pose an economic threat to cattle in Illinois. Problems are most likely where cattle graze in brushy or wooded areas.		
		Apply sufficient spray to thoroughly wet each animal; use up to 1 gallon finished spray per animal. Do not contaminate feed or water.		
		Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	2 gal/100 gal water.	0 days. Repeat application 10-14 days after first spray. Do not use more than once every 7 days.
		Co-Ral 25% WP or 11.6% EC (coumaphos)	4 lb 25% WP or 1 gal 11.6% EC/100 gal water.	0 days. Do not treat calves less than 3 months old or sick, convalescent, or stressed cattle. Do not spray within 10 days after shipping, weaning, or disease exposure. Do not spray in nonventilated areas. Do not apply in conjunction with phenothiazine, pyrethroids, synergists, or systemic organophosphate insecticides.
		Ectiban 5.7% EC (permethrin)	1 qt/100 gal water.	0 days. Do not apply more than once every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for control of ticks on cattle. Check product labels for dilution and application rates.)		
		malathion 57% EC	1-2 gal/100 gal water.	0 days. Do not apply to dairy cattle within 14 days of freshening. Do not treat calves less than 1 month old.
MOSQUITOES Annoyance may cause cattle to bunch in or near buildings and reduce their grazing.	Spray (to animals)	Mosquito populations are greatest near low, wet areas, ponds, or slow-moving streams. Reduction of mosquito breeding sites is necessary for long-term control.		
		Ectiban 5.7%	1 qt/100 gal water.	0 days. Do not apply more often than every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for the control of mosquitoes and horse flies on cattle. Check product labels for dilution and application rates.)		
		Vapona 23.4% EC (dichlorvos)	1 qt/6 gal water. Mist 1-2 fl oz/animal/day.	1 day. Do not contaminate feed or water. Do not wet skin. Do not apply in conjunction with trichlorfon.
		pyrethrin (0.1%) plus synergist	Mist 1-2 fl oz/animal.	0 days. Do not contaminate feed or water. Do not wet skin. Repeat as necessary.
HORSE FLIES, DEER FLIES (NHE 60) Large flies that feed on the back, shoulders, neck, and head. Blood feeding annoys cattle and reduces grazing and weight gain. Wounds attract other flies.	Spray	Adequate and practical control methods for horse flies and deer flies on pastured beef cattle are not available. Insecticide applications provide some relief but do not provide long-term control. Place cattle in barns or sheds to protect them from horse flies and deer flies.		
		Ectiban 5.7%	1 qt/100 gal water.	0 days. Do not apply more often than every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for the control of mosquitoes and horse flies on cattle. Check product labels for dilution and application rates.)		
		pyrethrin (0.5-1.0%) plus synergist	0.5% oil is ready to use; apply 2 fl oz/animal 3 times per week. Mix 1 gal 1% EC/10 gal water; apply 1 to 2 pt/animal every 3 days.	0 days. Apply to head, back, sides, belly, and legs. Do not contaminate feed or water.

Beef Cattle and Nonlactating Dairy Cattle, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
PASTURE FLIES (HORN FLIES, FACE FLIES, STABLE FLIES) Horn flies (NHE 59) are smaller than house flies but are similarly colored and marked. They have piercing mouthparts and are blood feeders. Horn flies congregate about the back, shoulders, and horns; on hot days they are mostly on the shady side of the animal or on the belly. Horn flies seldom follow animals into barns or sheds. Face flies (NHE 106) resemble house flies but are slightly larger and darker. Only females frequently visit cattle. They feed on secretions about the eyes, nose, and mouth. Annoyance to cattle reduces feeding. Face flies also transmit pinkeye. Face flies do not attack cattle in barns or sheds. Stable flies (NHE 61) resemble house flies but have a bayonetlike proboscis that protrudes from the front of the head. Stable flies are blood feeders that often attack the lower portion of the front legs. Stable flies attack both pastured and feedlot cattle.	Moving cattle into barns or sheds will reduce attacks by horn flies and face flies.			
	Back rubber or face rubber (oilers)	Mix insecticides with No. 2 fuel oil, No. 2 diesel fuel, or a label-recommended mineral oil. Mineral oils are less irritating than fuel oils. Do not use waste oil or motor oil. Service the rubbing device at least once per week. Self-treating devices are effective only if they are used regularly. Place rubbing devices in the entryways to water or mineral feeders to ensure usage. Effective horn fly control can be achieved with forced-use oilers, but only partial control of face flies is provided by these devices. Oilers do not control stable flies.		
		Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	1 qt/4 gal fuel or mineral oil.	0 days.
		Co-Ral 11.6% EC (coumaphos)	1 gal/13 gal fuel or mineral oil.	0 days.
		Delnav 15% EC or 30% EC (dioxathion)	2 qt 15% EC or 1 qt 30% EC/5 gal fuel or mineral oil.	0 days. Beef cattle only.
		Ectiban 5.7% EC (permethrin)	1 qt/10 gal diesel oil.	0 days.
		Permethrin II 10% EC (permethrin)	1 qt/20 gal fuel or mineral oil.	0 days.
		Ravap 28.7% EC (stirofos plus dichlorvos)	1 qt/7 gal fuel or mineral oil.	0 days. Beef cattle only.
	Dust bag	Dust bags are effective only if they are used regularly. Place them in the entryways to water or mineral feeders to ensure use. Keep dust bags dry and well charged; service at least once per week. Forced-use dust bags that contact the animal's face provide effective horn fly control and significant reductions in face flies; dust bags do not effectively control stable flies.		
		Co-Ral 1% D (coumaphos)	10 lb/bag.	0 days.
		Ectiban or Permethrin 0.25% D (permethrin)	10 lb/bag.	0 days.
		malathion 4% plus methoxychlor 5% D	1 10-lb bag/10-15 animals.	0 days. Beef cattle only.
		Rabon 3% D (stirofos)	4-8 lb/bag.	0 days.
	Feed additive	Feed additives prevent the development of face fly and horn fly larvae in cattle manure. Stable flies do not develop in fresh manure and are not controlled by feed additives. Face flies migrate considerable distances, so larval control in manure of a single herd will not significantly reduce fly populations if other herds in the area do not also receive feed additives. Animals must consume the recommended dosage for the feed additive to be effective.		
		Altosid 0.02% (methoprene)	0.25-0.5 lb/100 lb body weight/animal/month.	0 days. Feed mineral mix or block from May to September.
		phenothiazine 17.8%	Mix 1:3 with salt. Use 1 lb mixture/10 head/day.	0 days. Feed no other salt. Use from May to September.
		Rabon 97.3% or 7.76% Oral Larvacide (stirofos)	70 mg a.i./100 lb body weight/day.	0 days. Use from May through September. Mix with complete feeds, concentrates, or protein supplements.
	Ear tag or ear tape	Ear tags impregnated with fenvalerate, flucythrinate, or permethrin and permethrin-impregnated ear tapes effectively control horn flies and provide some control of face flies. They do not control stable flies. One tag or tape per cow will effectively control horn flies on cows and calves for up to 20 weeks. Using 2 tags per cow and 2 tags per calf will improve face fly control. Attach tags in late May or early June after fly populations have begun to increase. Remove tags in September or October. Combination tags containing permethrin plus chlorpyrifos (Dursban) and a synergist (piperonyl-butoxide) also are available; claims regarding their usefulness in controlling pyrethroid-resistant horn flies or delaying resistance development have not been documented. Tags containing the organophosphate Rabon (stirofos) provide fly control for approximately 6 weeks after application.		
		fenvalerate 8% tag (Ectrin, Insecta-Shield, Ear Tag Plus, Starbar, Vet Shack)	1-2 tags per head.	0 days. Apply when fly activity begins in spring; remove in fall or before slaughter.

Beef Cattle and Nonlactating Dairy Cattle, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
PASTURE FLIES, cont.	Ear tag or ear tape, cont.	flucythrinate 7.5% tag (Guardian)	1-2 tags per head.	0 days. Apply when fly activity begins in spring; remove in fall or before slaughter.
		permethrin 10% tag (Atroban, Apollo, Insecta-Gard, Gard Star, Fearing Du-flex, Gen-Sal, Permethrin)	1-2 tags per head.	0 days. Apply when fly activity begins in spring; remove in fall or before slaughter.
		permethrin 0.9 g tape (Ectiban)	1 tape per animal.	0 days. Apply when fly activity begins in spring; remove in fall or before slaughter.
		stirofos 13.7% tag (Rabon)	1-2 tags per head.	0 days. Apply when fly activity begins in spring; remove in fall or before slaughter.
	Spray	Sprays directed to animals should not contaminate feed or water.		
		Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	1 pint/1.5 gal water. Use 1-2 fl oz mist/animal/day. OR: 2 gal/50 gal water. Use 1-2 qt/animal.	0 days.
		Co-Ral 11.6% EC or 25% WP (coumaphos)	2 qt 11.6% EC or 2 lb 25% WP/100 gal water. Completely wet skin to runoff.	0 days. Do not apply to dairy cattle within 14 days of freshening.
		Delnav 15% EC or 30% EC (dioxathion)	1 qt 15% EC or 1 pt 30% EC/25 gal water.	0 days. Do not use more often than every 14 days. Do not use on dairy cattle or in dairy barns. Restricted-Use.
		Ectiban 5.7% EC (permethrin)	1 qt/100 gal water. Thoroughly wet animals.	0 days. Repeat as needed, but not more often than once every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for control of pasture flies on cattle. Check product labels for dilution and application rates.)		
		Ectrin 10% WDL (fenvalerate)	8 oz/2½ gal water. Mist 2-3 fl oz/animal every 4-7 days. Or mix 8 oz/12 gal water. Use 1 qt/animal every 7 days.	0 days. State-labeled use; applicator must have label in possession.
		methoxychlor 25% EC or 50% WP	2 qt 25% EC or 2 lb 50% WP/25 gal water.	0 days. Do not use on dairy cattle or in dairy barns.
		Rabon 50% WP (stirofos)	4 lb/75 gal water. Use ½ to 1 gal/animal.	0 days. Beef cattle only.
		Ravap 28.7% EC (stirofos plus dichlorvos)	1 gal/75 gal water. Use ½ to 1 gal/animal.	0 days. Beef cattle only. Repeat as needed, but not more often than once every 10 days.

Lactating Dairy Cattle

Insecticides listed in this section are registered for use on lactating dairy cattle. Most insecticides listed for use on beef cattle can be applied to nonlactating dairy cattle if the specified interval between application and freshening is observed. Follow all label directions.

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments	
LICE (NHE 18) 1/16 to 1/8 inch long. Biting lice are reddish, flattened, and active. Sucking lice are gray to blue and sluggish. Heavy populations cause reduced milk production and anemia. Symptoms are rough, patchy hair coats and a dirty appearance. Most troublesome in winter.	Dust bag	Place dust bags at milkroom exits. Keep bags charged and dry, and service at least once per month. (Co-Ral 1% dust and Ectiban and Permethrin 0.25% dusts can be used for direct hand-dusting; follow label directions.)			
		Co-Ral 1% D (coumaphos)	10 lb dust/bag.	0 days.	
		Ectiban or Permethrin 0.25% D (permethrin)	10 lb dust/bag. Self-treating.	0 days.	
	Spray	Apply sufficient spray to thoroughly wet each animal; use up to 1 gallon finished spray per animal. Do not contaminate feed, water, milk, or milking equipment.			
		Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	1 qt/12 gal water.	0 days. Make a second application 10-14 days after first. Repeat as needed, but not more than once every 7 days.	
		Co-Ral 11.6% EC or 25% WP (coumaphos)	1 qt 11.6% EC or 1 lb 25% WP/100 gal water.	0 days. Do not treat calves less than 3 months old.	
Ectiban 5.7% EC (permethrin)		1 qt/100 gal water.	0 days. Repeat application 14-21 days after first treatment.		
(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for the control of lice on dairy cattle. Check product labels for dilution and application rates.)					
CATTLE GRUBS	No pesticides are currently registered for control of cattle grubs on lactating dairy cattle.				
MANGE MITES Microscopic mites live on or within skin. Lesions vary with mite species. Infestations are greatest when cattle are crowded in shelters during winter.	Mange caused by chorioptic mites (barn itch mites) is the most common mite-induced disorder of Illinois dairy cattle. Infested cattle may or may not develop lesions; lesions usually appear as localized nodules that exude serum. Lesions are most prevalent from the tailhead to the hind heels. Insecticides listed for louse control on dairy cattle also control chorioptic mange. Cattle scabies (psoroptic mange) is a quarantinable disease. Its symptoms are lesions that occur first at the withers, over the back, and at the tailhead. The wounds itch, and rubbing leads to abscesses, especially on the shoulders and rump. Mites move to edges of scabs, causing lesions to enlarge and coalesce. Scabs may cover much of the body. Where cattle scabies is detected, contact the Illinois Department of Agriculture, Bureau of Animal Health, Illinois State Fairgrounds, Springfield, Illinois 62706, 217/782-4944.				
TICKS 8-legged adults of most species are reddish brown and less than 1/4 inch long. Engorged females may exceed 1/2 inch in length. Ticks are blood feeders and disease vectors.	Ticks are rarely economically important on Illinois dairy cattle. Problems are most likely where cattle graze in brushy or wooded areas.				
	Spray	Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	1 qt/12 gal water. Use up to 1 gal/animal.	0 days. Make a second application 10-14 days after first. Do not apply more often than once every 7 days.	
		Ectiban 5.7% EC (permethrin)	1 qt/25 gal water. Use 1-2 qt/animal.	0 days. Do not apply more often than once every 14 days.	
	(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for the control of ticks on dairy cattle. Check product labels for dilution and application rates.)				
	MOSQUITOES Mosquito populations are greatest near low, wet areas, ponds, and slow-moving streams. Reduction of mosquito breeding sites is necessary for long-term control.				
	Spray (to animals)	Ectiban 5.7% EC (permethrin)	1 qt/25 gal water. Use 1-2 qt per animal.	0 days. Do not apply more often than every 14 days.	
(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for the control of mosquitoes on dairy cattle. Check product labels for dilution and application rates.)					
Vapona 23.4% EC (dichlorvos)		1 qt/6 gal water. Mist 1-2 fl oz/animal/day.	1 day. Do not wet skin. Do not contaminate feed, water, milk, or milking equipment.		
	pyrethrin (0.03-0.10%) plus synergist (0.5-1.0%)	Ready to use. Mist 1-2 fl oz/animal.	0 days. Do not wet skin. Do not contaminate feed, water, milk, or milking equipment. Repeat as necessary.		

Lactating Dairy Cattle, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
PASTURE FLIES (HORN FLIES, FACE FLIES, STABLE FLIES) Horn flies (NHE 59) are smaller than house flies but are similarly colored and marked. They have piercing mouthparts and are blood feeders. Horn flies congregate about the back, shoulders, and horns; on hot days they are mostly on the shady side of the animal or on the belly. Horn flies seldom follow animals into barns or sheds.	Reduce attacks by	horn flies, face flies, deer flies, and horse flies by moving cattle into barns or sheds.		
	Back rubber or face rubber (oilers)	Mix insecticides with No. 2 fuel oil, No. 2 diesel fuel, or a label-recommended mineral oil. Mineral oils are less irritating than fuel oils. Do not use waste oil or motor oil. Service the oiler at least once per week. For self-treating devices to be effective, cattle must use them frequently. Place oilers in the entryways to water or mineral feeders or in the milking room exit. Well-used back rubbers or face rubbers will control horn flies and provide some face fly control. They will not control stable flies.		
		Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	1 gal/16 gal fuel or mineral oil.	0 days.
		Co-Ral 11.6% EC (coumaphos)	1 gal/13 gal fuel or mineral oil.	0 days.
		Ectiban 5.7% EC (permethrin)	1 qt/10 gal oil.	0 days.
		Permethrin II 10% EC (permethrin)	1 qt/20 gal fuel or mineral oil	0 days.
Face flies (NHE 106) resemble house flies but are slightly larger and darker. Only females frequently visit cattle. They feed on secretions about the eyes, nose, and mouth. Annoyance to cattle reduces feeding. Face flies also transmit pinkeye. Face flies do not attack cattle in barns or sheds.	Dust bag	For self-treating devices to be effective, cattle must use them regularly. Place dust bags in the entryways to water or mineral feeders or in the milking room exit. Keep dust bags dry; service at least once per week. Dust bags will control horn flies and provide some reduction in face fly problems. They will not control stable flies. (NOTE: Insecticide dusts listed below can also be used for direct hand-dusting; follow label directions.)		
		Co-Ral 1% D (coumaphos)	10 lb/dust bag.	0 days. Do not treat calves less than 3 months old.
		Ectiban or Permethrin 0.25% D (permethrin)	10 lb/dust bag.	0 days.
		Rabon 3% D (stirofos)	4-8 lb/dust bag.	0 days.
Stable flies (NHE 61) resemble house flies but have a bayonetlike proboscis that protrudes from the front of the head. Stable flies are blood feeders that often attack the lower portion of the front legs. Stable flies attack both pastured and feedlot cattle.	Spray	It is important that the following sprays do not contaminate feed, water, milk, or milking equipment.		
		Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	1 qt/3 gal water. Mist 1-2 fl oz/animal/day.	0 days.
		Ectiban 5.7% EC (permethrin)	1 qt/25 gal water. Use 1-2 qt/animal.	0 days. Retreat as needed, but not more often than every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for pasture fly control on dairy cattle. Check product labels for dilution and application rates.)		
		Ectrin 10% WDL (fenvalerate)	8 oz/2½ gal water; mist 2-3 oz/animal every 4-7 days. OR: 8 oz/12 gal water; use 1 qt/animal every 7 days.	0 days. State-labeled use; applicator must have label in possession.
		Vapona 23.4% EC or 1% EC oil base (dichlorvos)	1 qt 23.4%/6 gal water; use 1-2 fl oz/animal/day. OR: 1% EC (oil base), ready to use; mist 1-2 fl oz/animal/day.	0 days. Do not wet skin.
		pyrethrin (0.1%) plus synergist	Ready to use. Apply 1-2 fl oz/animal.	0 days. Repeat as needed.

Lactating Dairy Cattle, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
PASTURE FLIES, cont.	Feed additive	Animals must consume the recommended dosage for the feed additive to be effective. A feed additive reduces fly development only in treated manure; it does not control existing adult flies. Increase control by practicing good sanitation; remove nearby manure, silage, feed, and other fly-breeding materials.		
		Rabon 97.3% or 7.76% Oral Larvicide (stirofos)	70 mg a.i./100 lb body weight/day.	0 days. Feed in complete feeds, concentrates, or protein and mineral supplements from May to September.
	Ear tag or ear tape	Ear tags and ear tapes effectively control horn flies and reduce face fly problems. They do not control stable flies. One fenvalerate, flucythrinate, or permethrin tag or tape per cow will effectively control horn flies on cows and calves for up to 20 weeks. Using 2 tags per cow and 2 tags per calf will improve face fly control. Attach tags in late May or early June after fly populations have begun to increase. Remove tags in September or October. Combination tags containing permethrin plus chlorpyrifos (Dursban) and a synergist (piperonyl-butoxide) also are available; claims regarding their usefulness in controlling pyrethroid-resistant horn flies or delaying resistance development have not been documented. Tags containing the organophosphate Rabon (stirofos) provide fly control for approximately 6 weeks after application.		
		fenvalerate 8% ear tag (Ectrin, Insecta-Shield, Ear Tag Plus, Starbar, Vet Shack)	1-2 tags per head.	0 days. Apply tags when flies first appear in the spring. Remove in fall or before slaughter.
		flucythrinate 7.5% tag (Guardian)	1-2 tags per head.	0 days. Apply when fly activity begins in spring; remove in fall or before slaughter.
		permethrin 10% ear tag (Atroban, Apollo, Insecta-Gard, Gard Star, Fearing, Permethrin, Wellcome Tag)	1-2 tags per head.	0 days. Apply tags when flies first appear in spring. Remove in fall or before slaughter.
		permethrin 0.9 g ear tape (Ectiban)	1 tape per animal.	0 days. Apply tape when flies first emerge in spring. Remove in fall or before slaughter.
		stirofos 13.7% tag (Rabon)	1-2 tags per head.	0 days. Apply when fly activity begins in spring. Remove in fall or before slaughter.

Hogs

Pest	Treatment method	Material and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
MANGE MITES (AND LICE) Microscopic mites feed on or within skin and cause mange. Sarcoptic mange usually starts at the head and then spreads back; infested skin becomes dry, scurfy, or leathery. Rubbing may lead to raw or scabby areas. Demodectic mange is characterized by hard, round swellings on or below the skin surface.	Sarcoptic mange can be controlled effectively with the insecticides listed below. Although these insecticides will aid in controlling demodectic mange, there is no satisfactory chemical control for the hog follicle mites that cause demodectic mange. Prevent sarcoptic mange outbreaks by treating pigs as soon as possible after weaning; treat sows 30-45 days before farrowing; treat boars before the breeding season. Follow label precautions against the use of organophosphate sprays, dusts, or pour-ons simultaneously with medications used for internal parasite control. Do not contaminate feed or water. Isolate hogs with demodectic mange. Kill and destroy severely infested animals; market for slaughter the animals that are less severely attacked. Clean and disinfect pens, sheds, etc., before moving in uninfested animals.			
	Spray	Ectiban 5.7% EC (permethrin) (Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin 11 are registered for control of hog lice and mange. Check product labels for dilution and application rates.) Ectrin 10% WDL (fenvalerate) lindane 12.4% EC or 20% EC malathion 57% EC	1 qt/25 gal water. Spray animals thoroughly. 1 qt/50 gal water. Spray each animal thoroughly. 3 pt 12.4% EC or 1 qt 20% EC/100 gal water. Spray animals thoroughly. 1 qt/15 gal water. Treat animals, bedding, and walls thoroughly.	5 days. Repeat application after 14 days. 1 day. Repeat application in 14 days if necessary. 30 days. Treat twice at a 7-day interval. Do not treat pigs less than 3 months old. Do not treat sows within 2 weeks before farrowing or 3 weeks after farrowing. Restricted-Use. 0 days. Do not treat pigs less than 1 month old. Repeat treatment after 10 days.
	Dust	malathion 4-5% D	Thoroughly cover animals over 1 month old. Also treat pens and bedding. Use ¼-½ tbsp/pig for pigs less than 1 month old.	0 days. Repeat as needed. Gives only partial control of mange mites.
LICE Up to ⅛ inch long. Hog lice suck blood and cause irritation and itching of skin. Animals may rub infested areas and cause bleeding. Infested animals appear generally unthrifty.	Insecticides listed for controlling mange mites on hogs will also control lice. Do not contaminate feed or water. Follow label precautions against the use of organophosphate sprays, dusts, or pour-ons simultaneously with medications used for internal parasite control.			
	Spray	Co-Ral 25% WP (coumaphos) methoxychlor 50% WP	2 lb/100 gal water. Spray each animal thoroughly. 8 lb/100 gal water. Spray each animal thoroughly.	0 days. Do not treat animals less than 90 days old. Apply a second spray 10-14 days after first. 0 days. Make second application 14 days after first if needed.
	Dust	Co-Ral 1% D (coumaphos) Ectiban or Permethrin 0.25% D (permethrin) Rabon 3% D (stirofos)	1 oz/animal. 1 oz/animal. 3-4 oz/animal; 1 lb/150 sq ft of bedding for severe infestations.	0 days. Dust especially around shoulders and back. Repeat as needed, but not more than once every 10 days. 5 days. Make second application 14 days after first. 0 days. Do not retreat for 14 days.
	Pour-on	Ectrin 10% WDL (fenvalerate) Tiguvon 3% Pour-On (fenthion)	1 qt/25 gal water. Pour 4 fl oz/animal on head and back midline. 0.5 fl oz/100 lb body weight.	1 day. Add wetting agent according to label directions. Repeat application in 14 days if necessary. 14 days. May be used on gestating and lactating sows. Do not retreat within 35 days.

Sheep

Pest	Treatment method	Material and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
KEDS, LICE (NHE 53) Sheep keds (also called sheep ticks) are flattened, wingless, reddish brown flies about the size of house flies. Lice reach $\frac{1}{16}$ to $\frac{1}{8}$ inch in length. Biting lice are flattened and yellowish to reddish in color. Sucking lice are oval and bluish gray.	Spray	Apply enough spray to thoroughly cover each animal. Do not contaminate feed or water.		
		Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	2 gal/100 gal water. Use up to 1 gal/animal.	0 days. Make second application 10-14 days later. Do not retreat within 7 days.
		Co-Ral 25% WP (coumaphos)	Lice: 2 lb/100 gal water. Keds: 4 lb/100 gal water.	15 days. Do not treat lambs less than 3 months old.
		diazinon 50% WP	0.5 lb/100 gal water. Use 1 gal/animal.	14 days. Use high pressure and volume. Do not treat lambs less than 2 weeks old.
		Ectiban 5.7% EC (permethrin)	1 qt/25 gal water. Use 1-2 qt/animal.	0 days. Repeat application in 14 days. Do not treat more often than every 14 days.
		Ectrin 10% WDL (fenvalerate)	1 qt/100 gal water. Wet each animal with up to 1 qt of spray.	2 days. Repeat application in 30 days if necessary. Do not apply more than twice in the spring and twice in the fall.
		malathion 57% EC	1 gal/100 gal water.	0 days. Do not treat lambs less than 1 month old.
		Marlate 50% WP (methoxychlor)	8 lb/100 gal water. Spray each animal thoroughly.	0 days.
	Dust	Co-Ral 0.5% D	Follow label directions.	15 days. Treat once after shearing. Do not treat lambs less than 3 months old.
		diazinon 2% D	1½ oz/animal.	14 days. Do not treat lambs less than 2 weeks old.
		malathion 4-5% D	1-2 oz/animal.	0 days. Repeat application in 2-3 weeks if needed. Do not treat lambs less than 1 month old.
		Marlate 50% WP (methoxychlor)	1 tbsp/animal.	0 days. Treat only once.
	Pour-on	Ectrin 10% WDL (fenvalerate)	2 qt/25 gal water. Pour 4 fl oz/animal down midline of back.	2 days. Add wetting agent according to label directions. Repeat application in 30 days if necessary. Do not apply more than twice in the spring and twice in the fall.
WOOL MAGGOTS Cream-colored maggots are larvae of blow flies. Maggots live in wet, matted wool near the rear of the animal and in matted wool surrounding wounds.	Spray	Reduce wool maggot attacks by tagging sheep (shearing under the tail and between the hind legs), docking, and castrating before May. Practice good sanitation. Shear around and direct sprays to the infested areas.		
		Co-Ral 25% WP (coumaphos)	4 lb/100 gal water. Use 1 gal/animal.	15 days. Do not treat lambs less than 3 months old.
		diazinon 50% WP	0.5 lb/100 gal water. Use 1 gal/animal.	14 days. Do not treat lambs less than 2 weeks old.
SCAB MITES (SCABIES, WET MANGE)	Sheep scab is a quarantinable disease. Infested animals shed wool; skin becomes roughened and crusted. Where infestations are suspected, contact the Illinois Department of Agriculture, Bureau of Animal Health, Illinois State Fairgrounds, Springfield, Illinois 62706, 217/782-4944.			
HORN FLIES (NHE 59)	Spray	Co-Ral 25% WP (coumaphos)	2 lb/100 gal water.	15 days. Do not treat lambs less than 3 months old.
		Marlate 50% WP (methoxychlor)	2 lb/100 gal water.	0 days. Repeat treatment every 3 weeks as needed.
FACE FLIES (NHE 106)	Spray	pyrethrin (0.05-0.10%) plus synergist (0.5-1.0%)	1-2 fl oz/animal.	0 days. Apply daily to head, neck, and front legs as a fine mist. Do not wet hair or skin.

Goats

Pest	Treatment method	Material and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
LICE (NHE 53)	Spray	Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	2 gal/100 gal water. Use 2-4 qt/animal.	0 days. Make second application 14 days after first. Do not apply more often than every 7 days. Do not contaminate feed, water, milk, or milking equipment.
		Ectrin 10% WDL (fenvalerate)	1 qt/100 gal water. Wet each animal with up to 1 qt of spray.	2 days. Do not apply to lactating goats. Repeat application in 30 days if necessary. Do not apply more than twice in the spring and twice in the fall.
	Pour-on	Ectrin 10% WDL (fenvalerate)	1 qt/25 gal water. Pour 4 fl oz/animal down midline of back.	2 days. Do not apply to lactating goats. Add wetting agent according to label directions. Repeat application in 30 days if necessary. Do not apply more than twice in the spring and twice in the fall.
FACE FLIES (NHE 106), HORN FLIES (NHE 59), STABLE FLIES (NHE 61)	Spray	Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	1 qt/3 gal water. Use 1 pt/animal/week.	0 days. Do not apply more often than every 7 days. Do not contaminate feed, water, milk, or milking equipment.
HORSE FLIES, DEER FLIES (NHE 60)	Spray	pyrethrin (0.05-0.10%) plus synergist (0.5-1.0%)	1-2 fl oz/animal.	0 days. Apply to head, neck, and front legs as a fine mist. Do not wet hair or skin.

Poultry

Pest	Treatment method	Material and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
LICE, NORTH-ERN FOWL MITES (BIRD TREATMENT) (NHE 54) Chicken lice are flat-bodied, straw-colored, 1/16-inch-long lice with chewing mouthparts. They feed on feathers and skin flakes, irritating birds. Severe infestations reduce egg production. Northern fowl mites are dark red to black blood feeders that build up in the vent area. Mature mites are roughly 1/25 inch long. Feathers around the vent appear grayish or black from accumulation of mites, mite eggs, and excrement. Severe infestations reduce egg production and can cause death. Northern fowl mites are most troublesome in winter.	Spray	Co-Ral 25% WP (coumaphos)	Lice: 6 oz/5 gal water. Mites: 3 oz/5 gal water. Use 1 gal/100-125 birds, or 0.5 fl oz/bird.	0 days. Do not treat more than once per week. Do not treat within 10 days of vaccination or stress.
		Ectiban 5.7% EC (permethrin)	1 qt/25 gal water. Use 1 gal/100 birds.	0 days. Treat vent area thoroughly.
		malathion 57% EC	1 fl oz/gal water. Use 1 gal/100-125 birds.	0 days. Repeat treatment in 4-8 weeks or when necessary.
		Permethrin II 10% EC (permethrin)	1 qt/50 gal water. Use 1 gal/100 birds.	0 days. Treat vent area thoroughly.
		Rabon 50% WP (stirofos)	6.5 oz/5 gal water. Use 1 gal/100 birds or 1 fl oz/bird using at least 100-125 psi.	0 days. Do not treat more than once every 14 days.
	Dust	Ravap 28.7% EC Poultry Spray and Larvicide (stirofos + dichlorvos)	1 pt/6 gal water. Use 1 gal/100 birds or 1 fl oz/bird using at least 100-125 psi.	0 days. Do not treat more than once every 14 days.
		Sevin 50% WP or 80% SP (carbaryl)	6 oz 50% WP or 4 oz 80% SP/5 gal water. Use 1 gal/100 birds.	7 days. Repeat treatment in 4 weeks if necessary.
		Ectiban or Permethrin 0.25% D (permethrin)	Use 1 lb/100 birds.	0 days. Apply with shaker or hand duster. Treat vent area thoroughly.
		malathion 4-5% D	Use 1 lb/100 birds.	0 days. Apply with shaker or hand duster.
		Rabon 3% D (stirofos)	Use 1 lb/300 birds.	0 days. Apply with hand or power duster. Do not treat more than once every 14 days.
		Sevin 5% D (carbaryl)	Use 1 lb/100 birds.	7 days. Apply with shaker or hand duster. Do not treat more than once every 4 weeks.
	Strip	Permethrin 10% strip (permethrin)	1 or 2 strips per cage of up to 9 hens.	0 days. For northern fowl mite control.

Poultry, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
LICE, CHICKEN MITES, NORTH-ERN FOWL MITES (POULTRY HOUSE AND LITTER TREATMENT) (NHE 54) Chicken mites (or roost mites) are bright to dark red and $\frac{1}{25}$ inch long. They hide in cracks and crevices during the day and feed on birds at night. They are most prevalent in spring, summer, and fall, not in winter.	Spray	Co-Ral 25% WP (coumaphos)	6 oz/5 gal water. Use 1 gal/1,000 sq ft.	0 days. Apply thoroughly to litter, walls, ceilings, floors, roosts, nests, and adjacent areas. Force spray into all cracks and crevices.
		malathion 57% EC	2 fl oz/gal water. Use 1 gal/1,000 sq ft.	0 days. Apply liberally to litter, walls, ceilings, floors, roosts, nests, and adjacent areas. Force spray into cracks and crevices.
		Rabon 50% WP (stirofos)	0.5 lb/6 gal water. Use 1-2 gal/1,000 sq ft.	0 days. Apply thoroughly to litter, walls, roosts, cracks, crevices, and interiors.
		Ravap 28.7% EC Poultry Spray and Larvicide (stirofos + dichlorvos)	1 pt/6 gal water. Use 1-2 gal/1,000 sq ft.	0 days. Apply thoroughly to litter, walls, roosts, cracks, and crevices.
	Dust	Sevin 50% WP or 80% SP (carbaryl)	2 lb 50% WP or 1.5 lb 80% SP/5 gal water. Use 1-2 gal/1,000 sq ft.	7 days. Apply spray to walls, bedding, litter, and roosts. Force spray into cracks and crevices. Repeat as needed. Avoid contamination of nests, eggs, feed, and water.
		malathion 4-5% D	1 lb/50-60 sq ft.	0 days. Apply liberally to litter, walls, ceilings, roosts, nests, and adjacent areas.
		Rabon 3% D or 50% WP (stirofos)	1 lb 3% D or 2.5 oz 50% WP/100 sq ft.	0 days. Treat litter evenly and thoroughly.
DARKLING BEETLES (LESSER MEALWORMS) Cream-colored larvae infest decaying organic matter or moldy feeds. They are ingested and survive long enough to bite and damage the alimentary canal.	Spray	Sevin 5% D (carbaryl)	1 lb/40 sq ft.	7 days. Apply to litter, roosts, and adjacent areas. Do not apply to eggs or nests. Do not treat more than once every 4 weeks.
		Rabon 50% WP (stirofos)	2 lb/25 gal water. Use 1-2 gal/1,000 sq ft.	0 days. Apply evenly and thoroughly to litter, walls, center posts, and foundation walls.
	Dust	Sevin 80% SP or 40% or 43.4% suspensions (carbaryl)	62.5 lb 80% SP or 50 qt 40% or 43.4% suspensions/100 gal water. Use 2 gal/1,000 sq ft.	7 days. Apply evenly and thoroughly to litter or floor surface. Do not apply directly to poultry, nests, or eggs. Repeat as needed.
BED BUGS Flat, reddish brown, blood-sucking insects that feed at night. Rarely seen on birds during daylight.	Spray	Sevin 50% WP, 80% SP, or 40% or 43.4% suspensions (carbaryl)	8 lb 50% WP, 5 lb 80% SP, or 4 qt 40% or 43.4% suspensions/100 gal water. Use 1-2 gal/1,000 sq ft.	7 days. Apply thoroughly to walls, litter, and roost surfaces. Force spray into cracks and crevices. Do not apply directly to poultry, nests, or eggs. Repeat as needed.
	Dust	Sevin 5% D (carbaryl)	1 lb/40 sq ft.	7 days. Apply evenly to litter. Do not treat more than once every 4 weeks. Do not apply to eggs or nest.

Horses

Pest	Treatment method	Material and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
MANGE MITES Burrowing in skin causes pain and itching. Most prevalent in winter.	Spray	Ectiban 5.7% EC (permethrin)	1 qt/25 gal water. Use 1-2 qt/animal.	0 days. Repeat application in 14 days. Do not treat more often than every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for the control of mites on horses. Check product labels for dilution and application rates.)		

Horses, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
LICE 1/16 to 1/8 inch in length. Biting lice are yellow to red. Sucking lice are brownish to blue-gray. Head and neck, withers, and tailhead develop a scurfy appearance. Rubbing may create raw areas.	Spray	Co-Ral 25% WP or 11.6% EC (coumaphos)	0.5 lb 25% WP or 1 pt 11.6% EC/25 gal water. Treat animal thoroughly.	0 days.
		Ectiban 5.7% EC (permethrin)	1 qt/25 gal water. Use 1-2 qt/animal.	0 days. Repeat application in 14 days. Do not treat more often than every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for the control of lice on horses. Check product labels for dilution and application rates.)		
		malathion 57% EC or 25% WP	6.5-10 fl oz 57% EC or 0.75 lb 25% WP/5 gal water. Treat animal thoroughly.	0 days.
TICKS Seldom a problem unless horses graze in brushy or wooded areas.	Spray	Co-Ral 25% WP or 11.6% EC (coumaphos)	1 lb 25% WP or 1 qt 11.6% EC/25 gal water. Treat animal thoroughly.	0 days. Repeat as necessary.
		Ectiban 5.7% EC (permethrin)	1 qt/25 gal water. Use 1-2 qt/animal.	0 days. Do not treat more often than every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for the control of ticks on horses. Check product labels for dilution and application rates.)		
		malathion 57% EC or 25% WP	6.5-10 fl oz 57% EC or 0.75 lb 25% WP/5 gal water. Treat animal thoroughly.	0 days.
HORSE BOTS Flies are nearly as large as honey bees. They deposit eggs on the forelegs, throat, or muzzle area; fly activity severely annoys horses. Eggs are ingested; larvae (bots) develop within the horse's alimentary canal.	Feed additive	Anthon 90% Powder (trichlorfon)	5 g/250 lb body weight mixed with feed. Treat from mid-October to mid-December.	Nonfood use. Repeat after 3 to 4 months. Withdraw all feed 12-18 hours prior to and 3 hours after treatment. Do not treat colts under 4 months of age, mares in the last month of gestation, or horses to be used for food.
		Horse Wormer (dichlorvos)	19.5 g/300 lb body weight mixed with feed. Give to individual horse in half its normal grain ration.	Nonfood use. Treat 30 days after killing frost. Withhold water 4-6 hours before and 3 hours after consumption of the medicine. Do not treat sick animals or animals that have received tranquilizing drugs or other worm medicines within 1 week of application.
	Oral paste	Eqvalan 1.87% (ivermectin)	Ready to use. Follow directions on prefilled syringe.	Nonfood use.
	Injection	Consult with a veterinarian for treatment with carbon disulfide, dichlorvos (Equigard), or piperazine + carbon disulfide (Parvex Plus).		
	Preventive spray	malathion 57% EC	During fall months, sponge legs, under jaw, and chest of animal with a warm 0.5% malathion solution.	0 days. Eggs will be stimulated to hatch and the larvae will be prevented from burrowing into the animal. Retreat when more eggs accumulate. Do not use bare hands; use specially prepared gloves or rubber gloves.
SCREW WORMS, BLOW FLIES Maggots develop in wounds.	Spray	Co-Ral 25% WP (coumaphos)	1.3 oz/gal water. Treat wound lightly but thoroughly.	0 days.
		Coral 3% Spray Foam (coumaphos)	Ready to use. Spray thoroughly so that foam completely covers wound.	0 days.
	Dust	Co-Ral 5% D (coumaphos)	Ready to use. Treat wound lightly but thoroughly.	0 days.

Horses, continued

Pest	Treatment method	Insecticide and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
HORN FLIES, FACE FLIES, STABLE FLIES, HORSE FLIES, DEER FLIES, BLACK FLIES, MOSQUITOES	Spray	Co-Ral 25% WP or 11.6% EC (coumaphos)	0.5 lb 25% WP or 1 pt 11.6% EC/25 gal water. Treat animal thoroughly.	0 days.
		malathion 57% EC or 25% WP	6.5-10 fl oz 57% EC or 0.75-1.25 lb 25% WP/5 gal water. Treat animal thoroughly.	0 days.
		Ectiban 5.7% EC (permethrin)	1 qt/25 gal water. Use 1-2 qt/animal.	0 days. Do not treat more often than every 14 days.
		(Additional permethrin formulations including emulsifiable concentrates of Insectrin, Permaban, and Permethrin II are registered for the control of biting flies on horses. Check product labels for dilution and application rates.)		
		Ectrin 10% WDL (fenvalerate)	4 fl oz/3 gal water. Mist 8 fl oz spray per animal. Direct at face, head, shoulders, and legs.	Do not treat animals intended for slaughter.
		pyrethrin plus synergist	Ready to use.	0 days. Apply as a mist spray. Do not wet the hide. Repeat as needed.
		Rabon 1% Spray-n-Wipe (stirofos)	Apply 1-2 fl oz to flanks, belly, and back.	0 days.
	Dust	Co-Ral 1% D (coumaphos)	2 oz/animal.	0 days. Apply to the head, neck, shoulders, back, and tailhead. Repeat as needed.
		malathion 4% D	4 tbsp/animal.	0 days. Apply evenly along back line. Repeat at 10-14 day intervals.
	Wipe-on	Rabon 2% Gel Wipe-on (stirofos)	1-2 fl oz/animal.	0 days. Apply as directed every 2-3 days if needed.

FLY CONTROL IN LIVESTOCK BUILDINGS AND FEEDLOTS

Filth fly species that commonly inhabit livestock dwellings, feedlots, and nearby buildings include the house fly, stable fly, little house fly, and several blow fly species. These flies develop in a variety of moist, organic wastes including manure, spilled feed, decaying vegetation, and garbage. Common breeding sites are around feed bunks, at the edges of feeding floors, under fences, along stacks of hay or straw, and in accumulations of manure.

Although stable flies are biting flies that take blood meals from cattle, horses, and hogs, most other flies associated with confined livestock are nuisance pests, not blood-feeders. Neither stable flies nor nonbiting nuisance flies spend much time on their animal hosts, so successful fly control around confined livestock does not center on animal treatments. The use of dust bags, oilers, or ear tags provides little or no control of flies in or around buildings. Sprays directed to the legs and belly of cattle, horses, and hogs (apply as recommended in preceding sections for horn fly control on individual livestock species) may provide short-term relief from stable fly attack, but such applications are not likely to significantly reduce the overall fly problem.

Thorough sanitation practices are almost always necessary for successful fly control. Weekly removal of manure, decaying hay and straw, and spilled feeds disrupts fly breeding sites frequently enough to prevent the development of fly larvae. Removing wastes beneath feeders and along fences is especially important. If manure is temporarily piled before spreading, cover it with black plastic to prevent fly development. If manure is not removed weekly, leaving an 8-inch-thick manure residue at each cleanup may help to maintain populations of insect predators and parasites that limit fly populations. Poultry producers who do not remove manure weekly can maintain predator and parasite populations by removing manure from beneath only one row of cages at each cleanup.

Insecticide applications may be necessary in addition to good sanitation. Unless otherwise indicated, premise treatments listed below can be used in beef, dairy (other than milking rooms), swine, sheep, goat, poultry, and horse facilities. Separate recommendations for fly control in milking rooms are provided.

Pest	Treatment method	Material and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
HOUSE FLIES, STABLE FLIES, BLOW FLIES, ETC.	Space spray from mist blower or fogger	Space sprays (aerosols) provide rapid control of adult flies present at the time of application. Close doors and windows to reduce air movement during treatment. Daily to twice-weekly applications may be necessary where space sprays are the only treatments used. Animals may be present during application, but space sprays should not be applied directly to livestock. Do not apply space sprays in areas where animals have been treated directly with an insecticide during the previous 24 hours. Do not contaminate feed or water or use in milking rooms.		
		Dibrom 36% EC or 1% Ready-to-use Spray (naled)	1 qt 36% EC/40 gal water. Apply throughout building. Use 1 fl oz of 1% Ready-to-use Spray/3,000 cu ft.	0 days.
		Ectiban 5.7% EC (permethrin)	Misting: Use 4 fl oz/1,000 cu ft. Overhead system: 1 qt/12.5 gal fuel or mineral oil; use 4 fl oz/1,000 cu ft.	0 days.
		Permethrin II 10% EC (permethrin)	Misting: Use 4 fl oz/1,000 sq ft. Overhead system: 1 qt/12.5 gal fuel or mineral oil; use 4 fl oz/1,000 cu ft.	0 days.
		pyrethrins plus synergist	Follow label directions.	0 days.
		Vapona 23.4% EC (dichlorvos)	Misting: 1 pt/6 gal water; use 1 qt/8,000 cu ft. Fogging: 1 pt/3.5 gal diesel oil; use 1 pt/8,000 cu ft.	0 days.
		Vapona Feedlot 43.2% EC (dichlorvos)	1 gal/100 gal water. Use 5 gal/acre.	0 days. For cattle feedlots only.
	Surface residual spray	Surface sprays applied to walls, ceilings, partitions, posts, etc. kill flies at their resting sites and provide residual activity for 1-7 weeks. Products (or the listed concentrations of these products) recommended for use as residual sprays should not be applied directly to animals. Thoroughly spray surfaces to the point of run-off. Do not contaminate feed or water, and do not use residual sprays in milking rooms.		
		Baytex 45% EC (fenthion)	3 qt/25 gal water. Use 1 gal/500 sq ft.	0 days. Residue persists 3-5 weeks.
		Ciovap 12.5% EC (crotoxyphos plus dichlorvos)	2 gal/25 gal water. Use 1 gal/500 sq ft.	0 days. Do not use in poultry houses. Residue persists 1 week.
		Cygon 23.4% EC (dimethoate)	1 gal/25 gal water. Use 1-2 gal/1,000 sq ft.	0 days. Remove all animals before spraying. Keep them out for at least 4 hours. Do not use in dairy barns or poultry houses. Residue persists 2-4 weeks.
		Ectiban 25% WP or 5.7% EC (permethrin) (Atroban, Insectrin, Overtime, Permaban, and Permethrin II are other permethrin products registered for use as surface residual sprays.)	6 oz 25% WP/11 gal water or 1 qt 5.7% EC/12.5 gal water. Use 1 gal/750 sq ft.	0 days. Residue persists 3-7 weeks.
		Ectrin 10% WDL (fenvalerate)	1 qt/10 gal water. Use 1 gal/750 sq ft.	0 days for swine buildings. Use only in swine buildings and in horse barns where horses are not to be slaughtered. Residue persists 3-7 weeks.
		Rabon 50% WP (stirofos)	4-8 lb/25 gal water. Use 1-2 gal/1,000 sq ft.	0 days. Residue persists 2-4 weeks.

Fly Control, continued

Pest	Treatment method	Material and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
HOUSE FLIES, STABLE FLIES, BLOW FLIES, ETC., cont.	Bait	Baits may enhance house fly control; they do not attract stable flies. Bait applications of insecticides used in surface residual sprays can be prepared by adding sugar or corn syrup to the spray tank mixture. Follow directions on individual product labels. Dry baits can be sprinkled in areas where flies congregate. Do not place dry baits in areas where birds or animals will contact the bait. Do not contaminate feed or water.		
		Dipterex 1% Dry Bait (trichlorfon)	4 oz/1,000 sq ft.	0 days.
		Golden Malrin 1% Dry Bait (methomyl)	4 oz/1,000 sq ft.	0 days.
		Vapona 0.5% Dry Bait (dichlorvos)	4 oz/1,000 sq ft.	0 days.
	Resin strip	Farm Strip 20% resin strip (dichlorvos)	Suspend 1 strip/1,000 cu ft.	0 days. Close doors and windows so that vapor concentrations reach recommended levels. Do not hang near light bulbs or within reach of animals.
	Manure spray	Manure sprays control fly larvae that are developing in treated feces. Migration of adult flies from nearby areas can occur if any breeding sites remain untreated. Manure sprays are recommended only where manure cannot be removed on a weekly basis. Apply sprays at rates that wet the manure surface; soaking is not necessary. Repeat applications as necessary, but not more often than every 7 days. Do not apply where mammals or birds will come in contact with the manure. Do not apply treated manure to crops not listed on the insecticide label.		
		Cygon 23.4% EC (dimethoate)	0.5 pt/5 qt water. Apply as a coarse spray.	0 days.
		Rabon 50% WP or 24% EC (stirofos)	4 lb 50% WP or 1 gal 24% EC/25 gal water. Use 1 gal/100 sq ft. manure.	0 days.
		Ravap 28.7% EC (stirofos plus dichlorvos)	1 gal/25 gal water. Use 1 gal/100 sq ft manure.	0 days.
		Vapona 23.4% EC (dichlorvos)	1 gal/25 gal water. Use 1-2 qt/100 sq ft manure.	0 days.
	Feed additive	Feed additives used to prevent the development of fly larvae in feces provide minimal control of flies in livestock buildings. Feed additives do not reach house fly and stable fly larvae that develop in sites other than fresh manure. Good sanitation more effectively prohibits larval development. Animals must consistently consume recommended dosages for feed additives to be effective against fly larvae in manure.		
		Moorman's 0.02% IGR (methoprene)	0.25-0.5 lb/100 lb body weight/animal/month.	0 days. Feed mineral mix or block from May through September. Beef cattle and dairy cattle only.
		Rabon 7.76% or 97.3% Oral Larvacide (stirofos)	70 mg a.i./100 lb body weight/day.	0 days. Use from May through September. Mix with complete feeds, concentrates, or protein supplements. For beef cattle, dairy cattle, and hogs only.
	Biological agents	Several companies sell parasitic wasps for use in controlling flies around livestock buildings and feedlots. These predaceous wasps attack only flies; they do not sting (or bite) other insects, animals, or humans. Adult wasps (less than 1/10-inch long) deposit eggs on or inside fly larvae or pupae. Developing wasps kill the immature flies. Suppliers usually recommend wasp releases (several thousand wasps per release) before and during the fly season.		
		For biological control programs to effectively manage flies around livestock facilities, frequent and thorough sanitation practices (including manure removal, water management, and weed control) must be practiced. Some suppliers also recommend certain insecticide applications to supplement the control provided by biological agents. In many instances it is difficult to assess the separate impacts of parasitic wasps, sanitation practices, and insecticide applications. Although wasp releases have been shown to be effective for fly control in certain poultry housing, research data do not support other uses of currently available biological controls for flies. If biological control agents are to significantly contribute to fly control programs, integration with sanitation and chemical control practices is essential.		

Fly Control, continued

Pest	Treatment method	Material and formulation	Dilution and rate	Preslaughter interval, restrictions, comments
CONTROL OF FLIES IN MILKING ROOMS	<p>Although effective fly control is essential in dairy barns and milkrooms, small amounts of pesticides can be detected in milk, and their presence is often illegal. To control flies and avoid residue problems, the following steps are recommended:</p> <ol style="list-style-type: none"> 1. Use good sanitation and recommended insecticides in dairy barns to reduce the number of flies entering the milkroom. 2. Use sticky fly strips where appropriate. 3. Use tight screens (14-16 mesh) on milkroom doors and windows. Copper, aluminum, bronze, plastic, or rust-resisting screens are best. 4. Dichlorvos resin strips will give excellent control if windows and doors are kept closed when one strip per 1,000 cubic feet of space is used. Replace strips when they become ineffective. 5. Use a mist or aerosol spray of 0.06-0.1% pyrethrin plus piperonyl butoxide oil-based fly sprays in the milkroom when resin strips do not give adequate fly control. To prevent milk contamination, cover all milking utensils, cans, bulk tanks, and containers before spraying. 			
RATTAILED MAGGOTS	<p>The rattailed maggot is the larval stage of a syrphid fly. The 1¼-inch long maggot has a cylindrical body about ¼-inch long and a tail-like breathing tube that extends ½-inch from the posterior of the body. The adult fly is a bee-like hover fly that is not a pest on or around livestock or humans.</p> <p>Rattailed maggots live in highly polluted water such as that in livestock lagoons and manure pits. When larvae are ready to pupate, they migrate from lagoons and pits to adjacent, drier areas. They become pests when they enter feed, egg cartons, and milking rooms.</p> <p>To limit rattailed maggot development, eliminate floating solids within pits and keep pit sidewalls clean. Agitate the pit contents or pump the pit weekly. Although insecticides are of limited value in managing rattailed maggots, application of Ravap to the pit surface provides some control. Use 1 pint Ravap 28.7% EC per 3½ gallons fuel oil and apply 1 gallon of the spray mixture per 100 square feet of pit surface. (Do not agitate the pit contents after application.) Repeat applications as needed, but not more often than every 7 days.</p> <p>Limit rattailed maggot migration by constructing a soil barrier between the pit and the milking room. Migrating larvae will burrow into the loose soil to pupate instead of continuing their migration into milking rooms, etc.</p>			

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